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Why Don't Chimpanzees Use Stones as Lethal Weapons? A Murder Mystery

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On 11 November, 2018, BBC showed a one-hour-long documentary on the wild chimpanzees of Fongoli, in Senegal. These are the first savanna chimpanzees to be fully habituated, by the persistent and patient efforts of Jill Pruetz and her team. The film is part of David Attenborough's five-part 'Dynasties' series, and, like his previous efforts ('Life on Earth', 'Blue Planet', etc.), it is likely to be shown worldwide.

Its contents prompted me to pose the titular question, which puzzles me, so that I seek clarification or correction from the readers of *PAN*. To explain, the film's storyline follows the trials and tribulations of the alpha male, David, as he is savagely gang-attacked, and left for dead, with horrendous injuries. This extreme form of male-male competition is not new, as it has been recorded elsewhere in Africa, for example, at Gombe with Goblin, and at Mahale with Kasonta (Nishida 2012, pp. 235–236).

As the narrative unfolds, we see many superbly filmed episodes of displaying male chimpanzees, with all the elements that seem to be chimpanzee universals. Among these are many incidents of stone-throwing, most apparently as un-aimed flings than as aimed ballistic weapons targeted at opponents. Several camera shots show us that suitable stones are super-abundant, especially on the open and wide laterite plateaux. Pieces of laterite ranging in size from oranges to basketballs, lie about on the surface, readily picked up. (Laterite is a porous, friable stone, which often fractures on impact, especially after extensive weathering. It would not be useful for nut-cracking but makes easily thrown missiles.)

The climactic attack involves at least four adult males piling on to David, using hands and teeth. In the process, David loses at least one digit, and has severe slashing wounds to the scrotum and thigh. (We do not see wounds, if any, inflicted by him on his attackers.)

Which brings me to the title of this comment: Why doesn't one or more of the attackers just pick up a stone and hit David on the head? A single blow from the powerful upper limb(s) of a chimpanzee with a hand-held hammer-like weapon would render him unconscious or dead.

Not only does this weapon-use NOT occur in this particular case, but so far as I know, such a simple solution to the problem of dispatching an adult male fighting for his life has not been reported in previous gang assaults, at any field site. (Or even in less dramatic confrontations, even between one-on-one fights.)That is, stone tool use in agonistic display is common, especially in the lead-up to physical assaults, as shown here, but the actual attack entails use of the hands, feet and teeth only.

So, how to explain this conspicuous absence of hand-held percussive weapon-use? Stones used as missiles is well-known, dating back to Goodall's (1964) seminal paper published decades ago, which drew the first distinction between aimed and un-aimed throwing at Gombe. That chimpanzees make creative use of such thrown stones is exemplified by Mahale males heaving stones into streams to produce impressively noisy splashes that augment the effects (Nishida 2012, p. 219).

One might hypothesise that only chimpanzees who know of the effects of lithic percussion in other spheres would think to generalise this to weapon-use. However, the well-studied nut-cracking populations, also from West Africa, at Bossou and Taï *do* use percussive technology in food processing, but not as hand-to-hand weapons, so far as I know. The Fongoli chimpanzees do not use hammer-and-anvil in extractive foraging, but *do* smash baobab fruits on stone anvils by hand.

It may be that suitable stones are scarce raw materials elsewhere, compared with their abundance at Fongoli. (And at Mt. Assirik, McGrew *et al.* 1981). This absence of suitable raw materials might apply to evergreen rain forest populations of chimpanzees, especially in equatorial Africa. But well-studied mosaic sites such as Gombe and Mahale have plenty of stones, as evidenced by their use in display. To test this idea properly across sites would require detailed geological data, not just of the presence and distribution of the right-sized and shaped stones, but also of their extent of embeddedness in the substrate. It might be that gang attacks occur in places where stones are absent, by intention. To my knowledge, such systematic data have not been gathered.

Perhaps wild chimpanzees are not aware of the potentially damaging effects of hand-held percussive weapons? But this is belied by their use of sticks and boughs as clubs in display. Such beating of conspecifics with wooden tools has been described in other populations, for example males striking females at Kanyawara (Wrangham, unpublished data). So why not extend this utility to stones?

Chimpanzees engaged in agonism may exercise self-restraint, just as in many other animal species that do not extend male-male contest competition into fatal realms. Perhaps they are content to inflict injury but not inclined to direct killing? That is, as was the case with David, the attackers 'left him for dead', but amazingly he survived. This hypothesis may be untestable, and would require evolutionary modelling, but it seems unlikely to me.

Chimpanzees show lethal aggression in killing members of neighbouring groups, some of which they have known well, that is, not strangers, but no lethal hand-held weapons have been involved. Attackers in any case also risk being injured themselves, so efficient and conclusive ways of defeating the opponent would seem to be favoured by selection, all other things being equal.

It is always tricky to seek to explain the absence of a behavioural pattern (e.g., McGrew *et al.* 1997), but sometimes a conspicuous absence compels attention. Further thoughts or data on this mystery would be useful.

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